UI Modelling and Recognition of 3D virtual scenes and objects

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About Me ?

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About Me?

- Romuald Deshayes
- 23 Years old ⇜⇝ 1st Year PhD
- Belgium : University of Mons, Software Engineering Lab.

About Me ? - continued

Interrests

- Work in UI Modelling
- More specifically in Gestural interactions
- Modelling the interactions with virtual objects
  - Physical (continuous) interactions
  - Command/Action-type (discrete) interactions triggered by gestures

Introduction

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- Different objects with different ways of interacting with them

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[Target Domain] Virtual and Augmented Reality applications such as simulation, home automation and gaming

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Two main scientific contributions :

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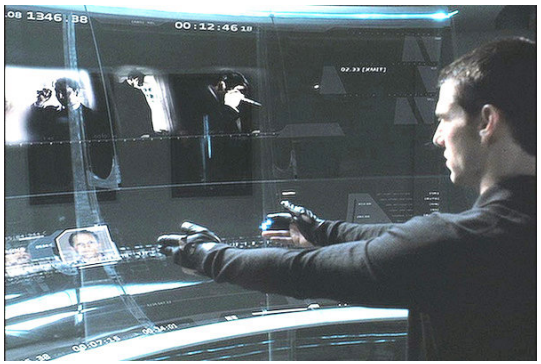
1) Generic solution to specify and execute interactions with virtual objects in an immersive way (Modelling !)



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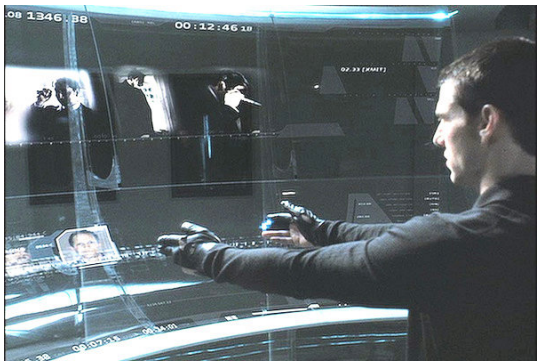

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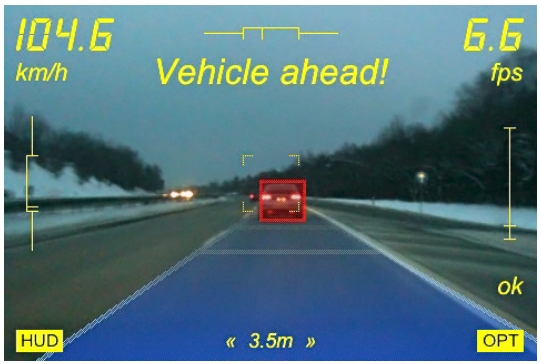

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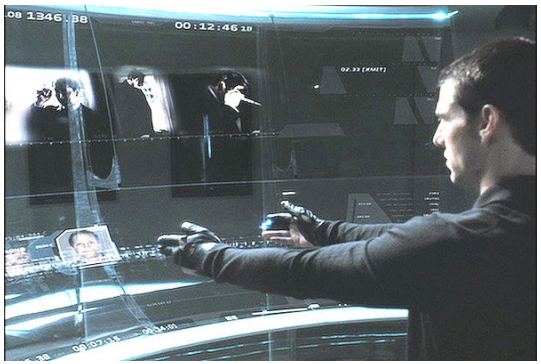

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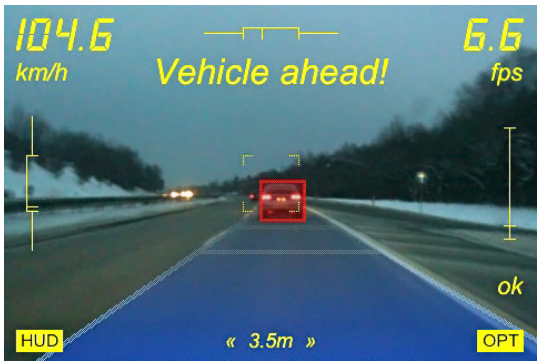

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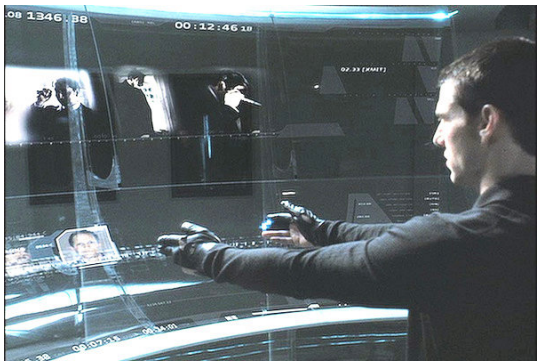

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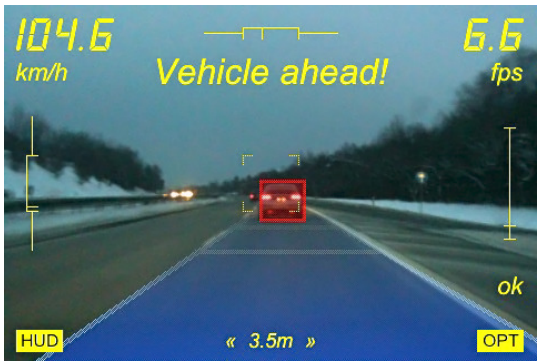

Combining those two ideas would allow various applications in many domains such as virtual reality, video games or home automation (domotics)

Gestural interaction

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Interacting with virtual objects in an immersive way ?

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- VR glasses

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Gestural Interaction : using the body to communicate with the computer

Kinect

New generation of 3D sensors, equipped with :

- Normal color Camera

Kinect

New generation of 3D sensors, equipped with :

- Normal color Camera
- Infrared Camera

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New generation of 3D sensors, equipped with :

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→ RGB-D terminology is used, because this device is able to generate a 3D map of the observed scene (in real time)

Kinect

Kinect allows to

- segment a scene

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Kinect allows to

- segment a scene
- detect a user and track him in real time (30hz)

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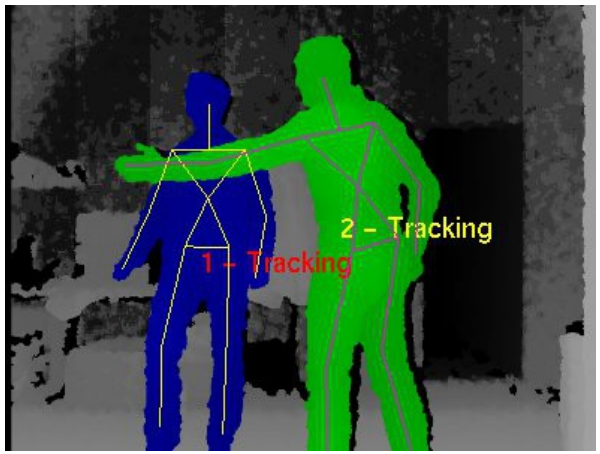

→ Better than 2D tracking

3rd dimension can be exploited to ease the segmentation and therefore the tracking.

Proof-of-concept application

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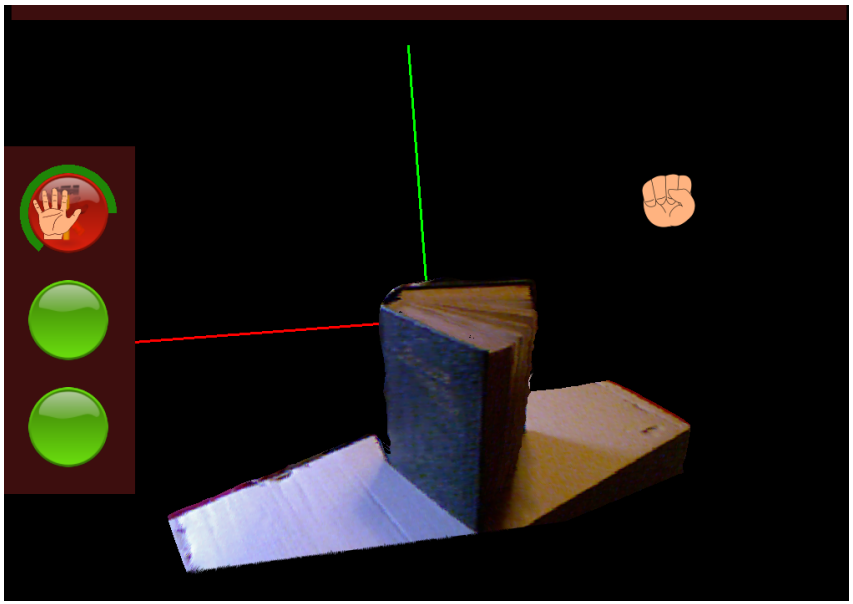
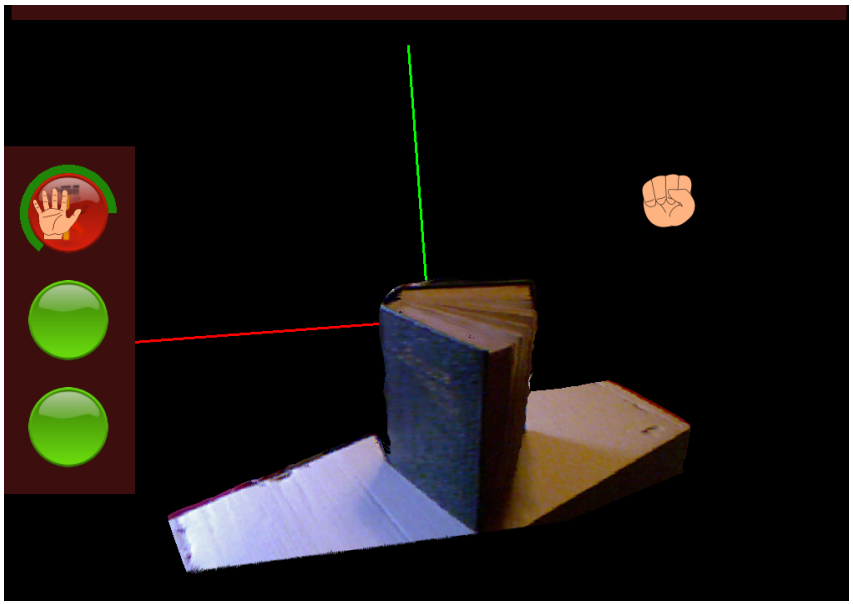
- 3D visual drawing tool



Proof-of-concept application

- 3D visual drawing tool
- Uses gestures to create and manipulate 3D objects



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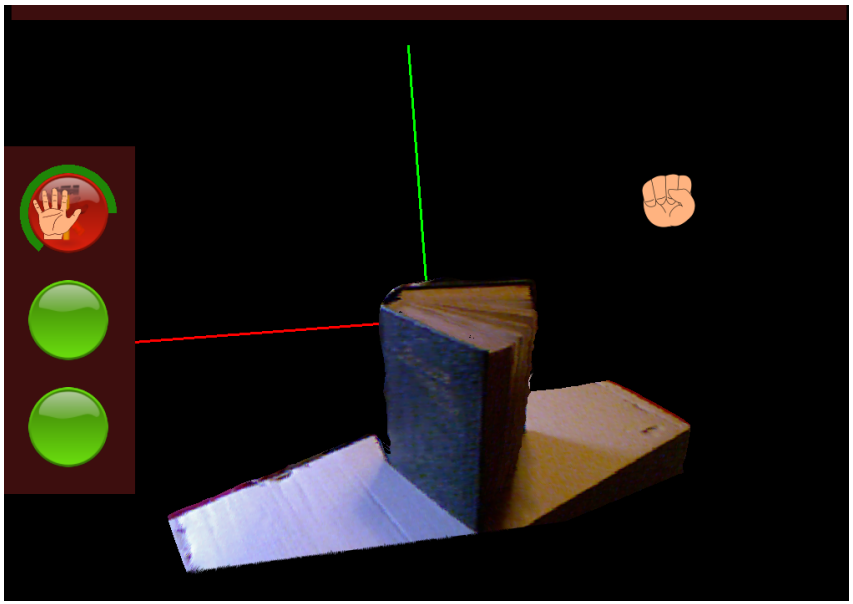

Proof-of-concept application

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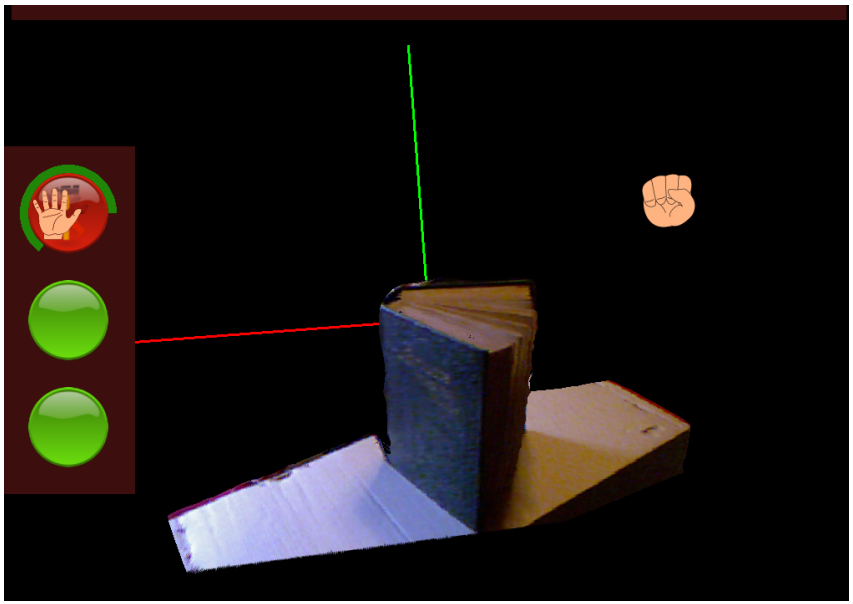
- (Part of Master thesis)



Modeling interactive behaviour

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Context

- Highly reactive systems (instantly react to user's stimuli)

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- Gesture-based interaction

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Visual language

- Higher level than code

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- Reduced complexity

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Visual language

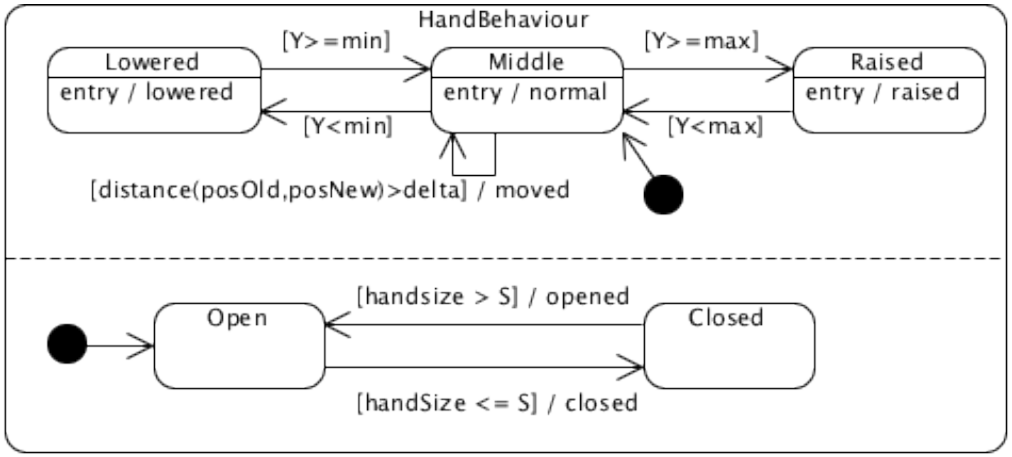
- Higher level than code
- Simple for non developpers
- Easier to evolve
- Reduced complexity
- Amenable to formal analysis

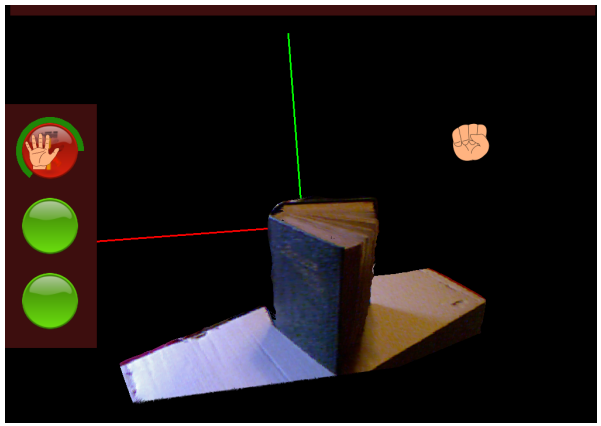
Statecharts

Statecharts

Statechart models - Hand

Example of statechart for modelling the behaviour of the hand in a gestural application





Work in progress

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Actual work : Virtual library

- Book shelve filled with books

Work in progress

Actual work : Virtual library

- Book shelve filled with books
- Choose a book with hands

Work in progress

Actual work : Virtual library

- Book shelve filled with books
- Choose a book with hands
- Read it with realistic gestures

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Thank you

Thank you for your attention !

Questions ?